

# Federal Railroad Administration Office of Safety Headquarters Assigned Accident Investigation Report HQ-2005-56 

Burlington Northern Santa Fe (BNSF) Kingman, Arizona<br>July 30, 2005



108. DRAW A SKETCH OF ACCIDENT AREA INCLUDING ALL TRACKS, SIGNALS, SWITCHES, STRUCTURES, OBJECTS, ETC., INVOLVED. HQ-56-
2005.jpg


## 109. SYNOPSIS OF THE ACCIDENT

For the purpose of this report, all times are expressed in Mountain Standard Time as Arizona does not revert to Daylight Savings Time as the other states do in the Mountain Time Zone.

On July 30, 2005, at 12:10 a.m. Mountain Standard Time (MST), eastbound BNSF freight train
Z-LACWSP-4-29 (Train \#1) collided with the rear end of a standing BNSF train S-OIGCHI-3-26 (Train \#2) in Kingman, Arizona. Train \#2 was also an eastbound train and had stopped behind another train doing work east of Kingman. There were no injuries and no release of hazardous materials.

The accident occurred on BNSF's Main Track No. 2 in Kingman at MP 515.4 on the Seligman Subdivision, Southwest Division. Approaching Kingman from the west, there is a long right-hand, compound curve with a maximum curvature of 4 degrees. Approximately 500 feet west of the signal at MP 516.3, Main Track No. 2 diverges from Main Track No. 1 and returns to a parallel configuration near MP 514.1. East of the signal, the track curves to the left at 3 degrees for approximately 1,000 feet before the point of collision. Main Track No. 2 ascends eastward at up to 1.4 percent. The railroad timetable and geographical directions of both trains is east. The maximum authorized speed for this subdivision is 70 mph , as designated in the current BNSF Timetable No. 2, effective October 20, 2004. However, the maximum operating speed at this location is 40 mph for passenger trains and 35 mph for freight trains.

The collision occurred on a long, lefthand curve on a high earthen fill. Visibility was temporarily obscured by the presence of an unused tool shed on the north side of Main Track No. 2. The accident did not affect Main Track No. 1.

Comparisons of the event recorders on the lead locomotives of both trains indicate that Train \#2 was stopped for approximately eight minutes before being struck by Train \#1. Analysis of the event recorder on the lead locomotive of Train \#1 indicates that it was operating at approximately 30 mph approaching the accident area and then slowed to approximately 18 mph after an emergency application of the air brakes, traveling approximately 500 feet to the point of impact.

Derailed equipment consisted of two locomotives and two cars on Train \#1 and one car on Train \#2. The lead locomotive (BNSF 749) of Train \#1 destroyed the rear articulated car (DDTX 73912) of Train \#2. The rear locomotive (BNSF 6189) of Train \#1 also derailed and the first articulated car (TTRX 552307) in the consist was destroyed. The second car (TTAX 78265) next to the locomotives on Train \#1 was upright and on the rails, but a later mechanical inspection by the BNSF determined that the car was raised in the air by the impact. Damages to the two locomotives and two cars on Train \#1 was $\$ 645,715$ and damage to the rear car of Train \#2 was $\$ 159,060$. Track damage was minimal, estimated at $\$ 2,000$.

The weather was clear at the time of the accident; temperature was 75 degrees Fahrenheit. However, crew members of both trains stated that it had been raining intermittently several minutes before the collision and there were numerous lightning strikes. A high wind warning had been issued previously for an area west of the derailment site but the wind was moderate at the time of the accident.

The probable cause of the accident is the crew of Train \#1 failed to comply with restricted speed in connection with the restrictive indication of Signal 5164 G and operated at 30 mph instead of restricted speed as required. The train collided with the rear end of standing Train \#2 on Main Track No. 2

## 110. NARRATIVE

Circumstances Prior to the Accident
Train \#1
The crew of Train \#1 went on duty at Needles, California, their home terminal, at 10:00 p.m. MST, July 29, 2005. The crew consisted of an engineer and conductor who both received more than the statutory off duty period prior to reporting for duty. The train departed Needles around 10:30 p.m. MST.

Train \#1 consisted of four locomotives and 71 loaded cars, all articulated equipment with intermodal containers. It weighed 4,672 tons, was 6,881 feet long and was scheduled to travel to Chicago, Illinois.

Train \#1 made no stops after leaving its home terminal and received clear signal indications enroute until it received a diverging approach (red over yellow) signal indication. It then went through the Griffith Siding around a train which was stopped on the main track. A diverging approach aspect requires the train to proceed on the diverging route, not exceeding the prescribed speed through the turnout. The crew said they received approach (yellow) indications as they neared Kingman. Approach indications require the train to be prepared to stop at the next signal. Trains exceeding 30 mph must immediately reduce to that speed. Train \#1 operated at 30 mph as it proceeded east of the signal at MP 516.3 at the west end of Kingman.

As Train \#1 approached Kingman, the engineer was seated on the right hand side of the locomotive at the engineer's controls and the conductor was in his seat on the left hand side of the locomotive. The event recorder on the lead locomotive indicated that the whistle was sounded at the Topeka Street Crossing adjacent to the signal at MP 516.3.

## Train \#2

The crew of Train \#2 consisted of an engineer and conductor who went on duty at 9:00 p.m. MST, July 29, 2005, and departed Needles, California (MP 578.0), their home terminal, at 9:30 p.m. MST. Both crew members received more than the statutory off duty period prior to reporting for duty.

Train \#2 consisted of six locomotives and 69 loaded cars. The cars were all articulated equipment with intermodal containers. It weighed 6,027 tons, was 6,587 feet long and was scheduled to travel to Kansas City, Missouri.

The crew received a high wind warning enroute which was lifted at about 10:10 p.m. MST. The train went through the Griffith Siding (MP 526.0) to go around a train. After leaving Griffith, the train received an approach medium indication (flashing yellow) approaching Kingman (MP 516.3). An approach medium indication requires the train to proceed prepared to pass the next signal not exceeding 40 mph and be prepared to enter the diverging route at the prescribed speed. The train later stopped west of the Louise Avenue road crossing in Kingman. After being stopped for about eight minutes, the engineer of Train \#2 said his train unexpectedly went into emergency and shortly thereafter he heard conversation on the radio of a collision. The crew then realized that they had been struck from behind.

The Accident
Analysis of the event recorder from the lead locomotive Train \#1 showed that the train was moving at 30 mph and had sounded the whistle at a crossing at MP 516.3 near the last signal before the collision. The point of collision was at MP 515.4 on Main Track No. 2 between intermediate signals 5164 G and 5134 G .

Both crew members of Train \#1 said they passed the signal at MP 516.3 at 30 mph on an approach indication (yellow) and then proceeded around a left-hand curve.

An approach indication requires that the train be prepared to stop at the next signal and reduce to 30 mph if exceeding that speed. The crew said that they saw the flashing lights of an End of Train (EOT) Device and the engineer placed the train in emergency. The speed was reduced to 18 mph before impact with the rear car of Train \#2.

BNSF conducted post accident toxicology testing of the crew of Train \#1 following the accident.
Analysis and Conclusions
Analysis
Following the accident, the BNSF Signal Supervisor sealed the equipment at intermediate signals $5214 \mathrm{G}, 5184 \mathrm{G}$, and 5164 G. FRA accompanied the BNSF when the equipment was unsealed and the event logs downloaded. Analysis shows the signal system functioned as intended.

FRA also accompanied BNSF managers during three re-enactment runs. One was accomplished after midnight on July 31, 2005. The signal system functioned as intended and Signal 5164 G displayed a red aspect. This aspect on Signal 5164 G requires the train to proceed at restricted speed. BNSF also conducted two additional runs after midnight on August 6, 2005. The purpose of the last two re-enactment runs was to determine if the street lights and crossing warning lights in Kingman affected the observation of Signal 5164 if it displayed restricting (red) and if the signal system functioned as intended. The re-enactments showed the signal system functioned as intended. The re-enactment team members on board the lead locomotives of the test trains observed Signal 5164 G approximately 3800 feet before the signal. Visibility of the signal was then blocked for one or two seconds by a small, unused tool shed west of the signal. Signal 5164 G was then observed at a point about 2500 feet west of the signal.

Conclusions:
Analyses of downloaded event logs indicate that the signal system functioned as intended and Train \#1 would have received a restrictive aspect at Signal 5164 G because of the stopped train ahead. The restricting (red) signal was bright and could not be confused with any other lights in the area. However, the re-enactment team recommended the removal of an unused BNSF tool shed west of Signal 5164 to provide a full view for an eastward train at more than 3000 feet in advance of the signal. Based on that recommendation, BNSF removed the shed on August 19, 2005.

FRA Post-Accident Forensic Toxicology Result Reports indicates that the employees tested had negative test results.
Applicable Rules
The signal at MP 516.3 ( 5164 G ) preceding the point of collision has a "G" number plate to indicate a grade marker. The System Special Instructions-General Signal Instructions Signal Rule 9.1 .13 require the train to operate at restricted speed when displaying a restrictive aspect. Analysis of the signal system indicates it was functioning as intended and the train should have operated at restricted speed beyond the signal.

The General Code of Operating Rules (GCOR) 6.27 defines restricted speed as a speed not exceeding 20 mph which allows the train to stop short of a train, engine, railroad car, men or equipment fouling the track, stop signal, or derail or switch lined improperly.

Probable Cause \& Contributing Factors
The crew of Train \#1 failed to comply with restricted speed in connection with the restrictive indication of Signal 5164 G and operated at 30 mph rather than at the restricted speed as required. The train collided with the rear end of standing Train \#2 on Main Track No. 2.

